

CLAIMS

What I claim is:

1. A thermoplastic article comprising at least one silver-containing antimicrobial agent and from at least 0.1% to 1.25% by weight of the polymer of at least one carboxylic acid salt component.

2. The thermoplastic article of Claim 1 wherein said carboxylic acid salt is present in an amount of from about 0.2 to about 1.0% by weight of the polymer.

3. The thermoplastic article of Claim 2 wherein said carboxylic acid salt is present in an amount of from 0.2 to about 0.5% by weight of the total polymer.

4. The thermoplastic article of Claim 3 wherein said carboxylic acid salt is present in an amount of about 0.3% by weight of the total polymer.

5. The thermoplastic article of Claim 1 wherein said at least one silver-containing antimicrobial agent is an inorganic silver-containing compound and wherein said at least one carboxylic acid salt is selected from the group consisting of at least C₁-C₄₀ carboxylic acid compound neutralized by at least one cation selected from the group consisting of monovalent metal ions, bivalent ions, and trivalent metal ions.

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6. The thermoplastic article of Claim 5 wherein said inorganic silver-containing antimicrobial agent is selected from the group consisting of silver zirconium phosphates, silver glasses, silver zeolites, and any mixtures thereof, and said carboxylic acid salt is selected from the group consisting of alkali metal acetates, alkali metal stearates, alkaline earth metal acetates, alkaline earth metal stearates, zinc stearate, tin(II) stearate, aluminum stearate, and any mixtures thereof.
7. The thermoplastic article of Claim 6 wherein said inorganic silver-containing antimicrobial agent is silver zirconium phosphate, and wherein said carboxylic acid salt is calcium stearate.
8. The thermoplastic article of Claim 2 wherein said at least one silver-containing antimicrobial agent is an inorganic silver-containing compound and wherein said at least one carboxylic acid salt is selected from the group consisting of at least C₁-C₄₀ carboxylic acid compound neutralized by at least one cation selected from the group consisting of monovalent metal ions, bivalent ions, and trivalent metal ions.
9. The thermoplastic article of Claim 8 wherein said inorganic silver-containing antimicrobial agent is selected from the group consisting of silver zirconium phosphates, silver glasses, silver zeolites, and any mixtures thereof, and said carboxylic acid salt is selected from the group consisting of alkali metal acetates, alkali metal stearates, alkaline earth metal acetates, alkaline earth metal stearates, zinc stearate, tin(II) stearate, aluminum stearate, and any mixtures thereof.

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10. The thermoplastic article of Claim 9 wherein said inorganic silver-containing antimicrobial agent is silver zirconium phosphate, and wherein said carboxylic acid salt is calcium stearate.

11. The thermoplastic article of Claim 3 wherein said at least one silver-containing antimicrobial agent is an inorganic silver-containing compound and wherein said at least one carboxylic acid salt is selected from the group consisting of at least C₁-C₄₀ carboxylic acid compound neutralized by at least one cation selected from the group consisting of monovalent metal ions, bivalent ions, and trivalent metal ions.

12. The thermoplastic article of Claim 11 wherein said inorganic silver-containing antimicrobial agent is selected from the group consisting of silver zirconium phosphates, silver glasses, silver zeolites, and any mixtures thereof, and said carboxylic acid salt is selected from the group consisting of alkali metal acetates, alkali metal stearates, alkaline earth metal acetates, alkaline earth metal stearates, zinc stearate, tin(II) stearate, aluminum stearate, and any mixtures thereof.

13. The thermoplastic article of Claim 12 wherein said inorganic silver-containing antimicrobial agent is silver zirconium phosphate, and wherein said carboxylic acid salt is calcium stearate.

14. The thermoplastic article of Claim 4 wherein said at least one silver-containing antimicrobial agent is an inorganic silver-containing compound and wherein said at least one carboxylic acid salt is selected from the group consisting of at least C₁-C₄₀ carboxylic acid compound neutralized by at least one cation selected from the group consisting of monovalent metal ions, bivalent ions, and trivalent metal ions.

15. The thermoplastic article of Claim 14 wherein said inorganic silver-containing antimicrobial agent is selected from the group consisting of silver zirconium phosphates, silver glasses, silver zeolites, and any mixtures thereof, and said carboxylic acid salt is selected from the group consisting of alkali metal acetates, alkali metal stearates, alkaline earth metal acetates, alkaline earth metal stearates, zinc stearate, tin(II) stearate, aluminum stearate, and any mixtures thereof.

16. The thermoplastic article of Claim 15 wherein said inorganic silver-containing antimicrobial agent is silver zirconium phosphate, and wherein said carboxylic acid salt is calcium stearate.

17. A method of forming a thermoplastic article comprising the steps of providing a thermoplastic polymer, introducing at least one silver-containing antimicrobial agent and 0.1% to 0.75% by weight of the total polymer of at least one carboxylic acid salt component thereto, melting said resultant mixture of polymer, silver-containing antimicrobial agent, and at least one carboxylic acid salt, and cooling said molten mixture in a desired shaped thermoplastic article.

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18. The method of Claim 17 wherein said carboxylic acid salt is present in an amount of from about 0.2 to about 0.5% by weight of the polymer.

19. The method of Claim 18 wherein said carboxylic acid salt is present in an amount of from 0.2 to about 0.4% by weight of the total polymer.

20. The method of Claim 19 wherein said carboxylic acid salt is present in an amount of about 0.3% by weight of the total polymer.

21. The method of Claim 17 wherein said at least one silver-containing antimicrobial agent is an inorganic silver-containing compound and wherein said at least one carboxylic acid salt is selected from the group consisting of at least C₁-C₄₀ carboxylic acid compound neutralized by at least one cation selected from the group consisting of monovalent metal ions, bivalent ions, and trivalent metal ions.

22. The thermoplastic article of Claim 21 wherein said inorganic silver-containing antimicrobial agent is selected from the group consisting of silver zirconium phosphates, silver glasses, silver zeolites, and any mixtures thereof, and said carboxylic acid salt is selected from the group consisting of alkali metal acetates, alkali metal stearates, alkaline earth metal acetates, alkaline earth metal stearates, zinc stearate, tin(II) stearate, aluminum stearate, and any mixtures thereof.

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23. The thermoplastic article of Claim 22 wherein said inorganic silver-containing antimicrobial agent is silver zirconium phosphate, and wherein said carboxylic acid salt is calcium stearate.

24. The thermoplastic article of Claim 18 wherein said at least one silver-containing antimicrobial agent is an inorganic silver-containing compound and wherein said at least one carboxylic acid salt is selected from the group consisting of at least C₁-C₄₀ carboxylic acid compound neutralized by at least one cation selected from the group consisting of monovalent metal ions, bivalent ions, and trivalent metal ions.

25. The thermoplastic article of Claim 24 wherein said inorganic silver-containing antimicrobial agent is selected from the group consisting of silver zirconium phosphates, silver glasses, silver zeolites, and any mixtures thereof, and said carboxylic acid salt is selected from the group consisting of alkali metal acetates, alkali metal stearates, alkaline earth metal acetates, alkaline earth metal stearates, zinc stearate, tin(II) stearate, aluminum stearate, and any mixtures thereof.

26. The thermoplastic article of Claim 25 wherein said inorganic silver-containing antimicrobial agent is silver zirconium phosphate, and wherein said carboxylic acid salt is calcium stearate.

27. The thermoplastic article of Claim 19 wherein said at least one silver-containing antimicrobial agent is an inorganic silver-containing compound and wherein said at least one carboxylic acid salt is selected from the group consisting of at least C₁-C₄₀ carboxylic acid compound neutralized by at least one cation selected from the group consisting of monovalent metal ions, bivalent ions, and trivalent metal ions.

28. The thermoplastic article of Claim 27 wherein said inorganic silver-containing antimicrobial agent is selected from the group consisting of silver zirconium phosphates, silver glasses, silver zeolites, and any mixtures thereof, and said carboxylic acid salt is selected from the group consisting of alkali metal acetates, alkali metal stearates, alkaline earth metal acetates, alkaline earth metal stearates, zinc stearate, tin(II) stearate, aluminum stearate, and any mixtures thereof.

29. The thermoplastic article of Claim 28 wherein said inorganic silver-containing antimicrobial agent is silver zirconium phosphate, and wherein said carboxylic acid salt is calcium stearate.

30. The thermoplastic article of Claim 20 wherein said at least one silver-containing antimicrobial agent is an inorganic silver-containing compound and wherein said at least one carboxylic acid salt is selected from the group consisting of at least C₁-C₄₀ carboxylic acid compound neutralized by at least one cation selected from the group consisting of monovalent metal ions, bivalent ions, and trivalent metal ions.

31. The thermoplastic article of Claim 32 wherein said inorganic silver-containing antimicrobial agent is selected from the group consisting of silver zirconium phosphates, silver glasses, silver zeolites, and any mixtures thereof, and said carboxylic acid salt is selected from the group consisting of alkali metal acetates, alkali metal stearates, alkaline earth metal acetates, alkaline earth metal stearates, zinc stearate, tin(II) stearate, aluminum stearate, and any mixtures thereof.

32. The thermoplastic article of Claim 31 wherein said inorganic silver-containing antimicrobial agent is silver zirconium phosphate, and wherein said carboxylic acid salt is calcium stearate.